

Mars Micromissions: Science at Mars and Beyond

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Current NASA Mars Architecture calls for the development of low-cost, common micromission bus design that launches to Mars as a secondary payload on an Ariane 5. Plans call for a launch of either a Mars Airplane or a Communications/Navigation Orbiter as early as November 1, 2002. Beginning in 2005, in cooperation with the French space agency CNES, at least two Mars micromissions will be launched each Mars opportunity. These missions consist of some combinations of probe carriers, science orbiters, or communication/navigation orbiters. Science payloads range in mass from 5 kg into Mars orbit to a 45 kg entry probe (or probes) to the atmosphere. In addition to these science opportunities, small changes to the Mars micromission multi-purpose spacecraft design enable missions to other destinations such as Venus, Mercury, Near-Earth and Main-Belt Asteroids, the Moon and the Earth-Sun Libration points. Table 1 summarizes the micromission spacecraft payload capabilities for some possible missions and launch opportunities. It is anticipated that many missions that fit the micromission requirements envelope will use this new capability. In addition to the missions discussed, the Mars micromission spacecraft could be utilized to demonstrate space technologies. As these examples show, the micromission spacecraft bus is a cost-effective capability to perform a wide variety of missions at Mars and beyond.

Table 1: Mars Micromission Payload Capabilities

Destination	Launch Year	Payload to Approach (kg)	Payload to Orbit (kg)
Mars	2003	42	6
	2005	40-45	5-10
	2007	45-50	10-15
Venus	2002	30-40	0-5
	2004	40-50	0-5
	2005	45-55	5-10
	2007	50-60	10-15
Mercury	2002	10-20	None
	2004	0-10	None
	2005	5-15	None
Main Belt Asteroids	Same as Venus	30-50	None
Near-Earth Asteroids	Any	50-60	None
Moon	Any	80-90	30-50
Earth-Sun Libration Points	Any	Not Applicable	60-70